

ZABER TECHNOLOGIES

A Reference Guide for Vendors

Cosmetic Surface Guidelines
for Machined Components

Contents

SCOPE AND PURPOSE..... 2

MATERIAL..... 2

MACHINING..... 2

 Tooling Marks..... 2

 Finishing Processes Marks..... 2

ANODIZING..... 2

 Colouring..... 2

 Racking Marks..... 3

 Incomplete Anodizing..... 3

PART HANDLING..... 3

REWORK..... 3

VENDOR SUPPORT..... 3

DEFINITIONS..... 4

APPENDIX A - EXAMPLES OF UNACCEPTABLE SURFACE FINISHES..... 6

APPENDIX B - EXAMPLES OF ACCEPTABLE SURFACE FINISHES..... 10

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Scope and Purpose

This document is intended to provide Zaber's vendors with guidelines for acceptable finishing standards for our machined components.

Consistency in the visual aspect of our products is important to Zaber and our customers. We therefore require that our vendors follow the cosmetic finishing standards described below to provide us parts with a homogenized cosmetic look.

This document is intended to address machined and sheet metal parts only. These guidelines apply to all [cosmetic surfaces](#).

Material

Choice of material is important as some defects will not show up until after anodizing. For this reason, [Mill Certified Material](#) should be used only unless otherwise specified ([Figures A1 and A2](#), [Appendix A](#)).

Soft streaking made during the extrusion process is hard to avoid and is therefore acceptable as long as it is not deep enough to be felt when running a fingernail with slight pressure perpendicular to the streak ([Figure B1](#), [Appendix B](#)).

Machining

In general, parts are to be free of surface imperfections and [machining marks](#) when holding parts at arm's length distance and/or if the imperfections cannot be felt under fingernail pressure ([Figures A3 to A5](#), [B2](#)).

Tooling Marks

Tooling marks may be acceptable if they respect the rules stated previously. Surfaces indicated on drawings as reference surfaces need to meet tolerances irrespective of tooling marks ([Figures A6 to A7](#), [B3](#)).

Finishing Processes Marks

If additional [polishing](#) processes are used, marks may be acceptable if they are in uniform pattern and linear to the part. As always, part finishing must maintain drawing tolerances ([Figures A8 to A9](#), [B4 to B7](#)).

Anodizing

When an anodized finish is indicated on part drawings, anodizing is intended to be done as per general accepted anodizing practices ([MIL-A-8625](#)).

Colouring

Unless otherwise noted on a drawing, when black anodizing is requested, the colour should show no fading or discoloration ([Figure A10](#)). Acceptable FED-STD-595 colour codes are:

- 17038
- 25049
- 27038
- 27040
- 27041
- 37030
- 37031
- 37038

Racking Marks

Non-anodized points can be left where the material was held, or racked, during anodizing. However, it is especially important that parts are not racked on any cosmetic surfaces. Racking instructions, as indicated in drawing notes, should be followed. If it is unclear which surfaces to rack, please contact Zaber (*Figures A11 to A12, B8*).

After anodizing, care should be taken when removing parts from the racking. Parts damaged during **handling** will not be accepted (*Figure A13*).

Incomplete Anodizing

Parts should be anodized fully over the surface unless otherwise noted. There should be no areas where anodizing is missing or is not uniform (*Figures A14 to A17*).

Part Handling

Parts should be packaged so as to prevent damage throughout the process. Any scratches exposing the base material are not acceptable. Small scratches that do not break through the anodizing layer and are not visible when holding a part at arm's length distance may be acceptable (*Figures A18 to A19*).

Rework

Rework of surfaces is allowed as long as the reworked part meets all engineering data requirements and these guidelines.

Vendor Support

Cosmetic finishing standards and uniformity of part surfaces are important to us.

If you have any concerns or questions, please contact our QC team:

1-604-569-3780 ext 154 (Direct)

1-888-276-8033 (Toll Free Canada/USA)

qc@zaber.com

Definitions

Abrasion

Surface imperfection that doesn't remove or displace material and appears as a scuff or a change to the surface finish.

Anodizing

An electrolytic passivation part finishing process used on the surface of aluminum parts.

Cosmetic Surface

A surface highly visible to the end customer. All surfaces are considered cosmetic unless noted otherwise.

Dents, Dings, Nicks, or Impressions

Any small, measurable depression in a part surface or edge.

Extrusion Process

Process used to create objects of a fixed cross-sectional profile. A material is pushed through a die of the desired cross-section.

Handling

Short distance movement of material within the confines of a building or between a building and a transportation vehicle.

Leaching

The runoff of dye or other liquids during anodizing that causes discolouration.

Machining Marks

Visible marks that appear on the surface of a part as the result of a manufacturing process, including, but not limited to: depressions, gouges, impressions, clamping marks, etc.

MIL-A-8625

The specification for much of the anodizing specified for military and aerospace products. It also forms the basis for many anodizing specifications that are proprietary to individual companies.

Mill Certified Material

Material certified with a quality assurance document that certifies its chemical and physical properties and states that a product made of metal is in compliance with an international standards organization's specific standards.

Plugged Hole or Masking

The process by which a cover or plug is applied to a part so as not to have a portion of the part anodized.

Polishing

To remove roughness from a surface and make it smooth by rubbing, with or without a compound.

Racking

The point or way in which a part is held during the anodizing process.

Reference Surface

A datum surface from which measurements are made relative to.

Scoring

Type of abrasive wear, referring to a rough surface, usually with cuts. It appears as long scratches in the direction of motion.

Scratches

Lines or marks on a surface, often created by a sharp object.

Speckling

Spotlike portions of a part that have gone through the anodizing process but have been left with a variation in colour which differs from the rest of the whole.

Surface Imperfections and/or Flaws

Surface interruptions such as cracks, nicks, dings, dents, scratches, or ridges.

Surface Texture

Small local deviations of a surface from a true plane. It also describes what pattern the deviations may create.

Tooling Marks

Visible lines left after a tool machines a part.

Appendix A - Examples of Unacceptable Surface Finishes



Figure A1: Not acceptable – Speckling from base material after anodizing



Figure A4: Not acceptable – Dent visible after anodizing

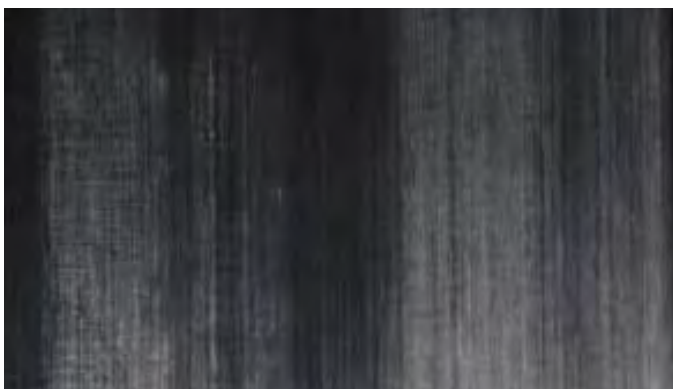


Figure A2: Not acceptable – Colour striations due to material quality



Figure A5: Not acceptable – Visible scratch after anodizing



Figure A3: Not acceptable – Imperfections on extrusions deep enough to show after anodizing



Figure A6: Not acceptable – Visible tooling marks

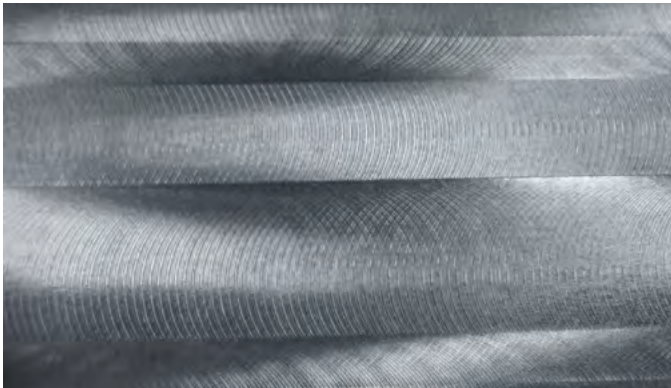


Figure A7: Not acceptable – Visible tooling marks, post anodization



Figure A10: Not acceptable – Faded colour, inadequate dye



Figure A8: Not acceptable – Visible scoring

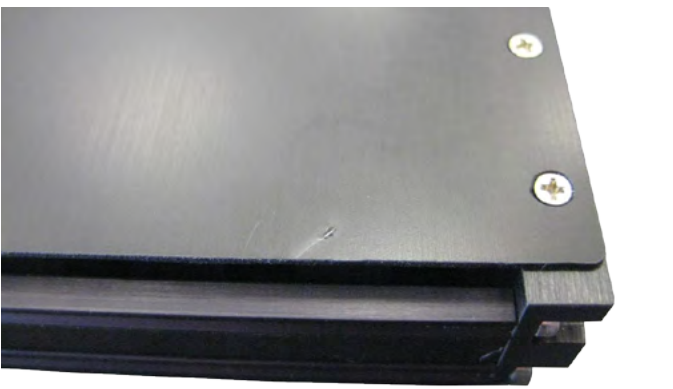


Figure A11: Not acceptable – Racking on cosmetic surfaces

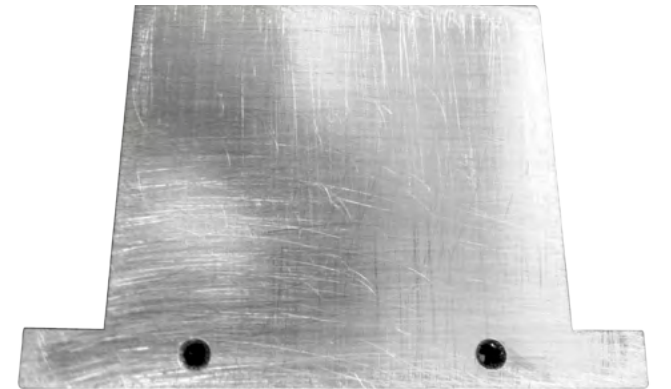


Figure A9: Not acceptable – Visible hand scotch brite marks



Figure A12: Not acceptable – Racking on cosmetic surfaces

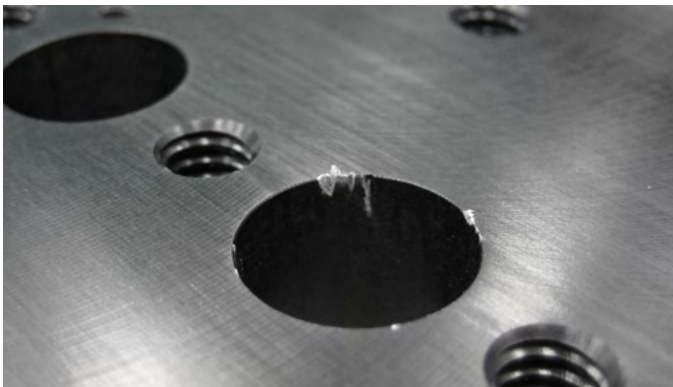


Figure A13: Not acceptable – Scratches from racking removal



Figure A16: Not acceptable – Watermarks



Figure A14: Not acceptable – Leaching mark



Figure A17: Not acceptable – Missing anodizing on threads



Figure A15: Not acceptable – Speckling



Figure A18: Not acceptable – Scratch exposing metal layer



Figure A19: Not acceptable – Scratches from handling, visible after anodizing

Appendix B - Examples of Acceptable Surface Finishes



Figure B1: Acceptable – Streaking caused by extrusion process



Figure B4: Acceptable – Surface finished with face mill

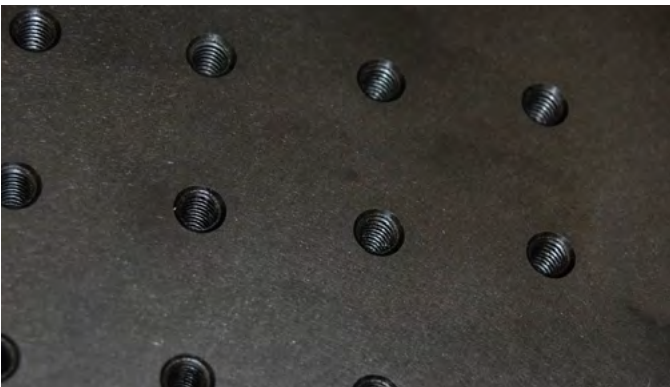


Figure B2: Acceptable – Surface free of visible imperfections

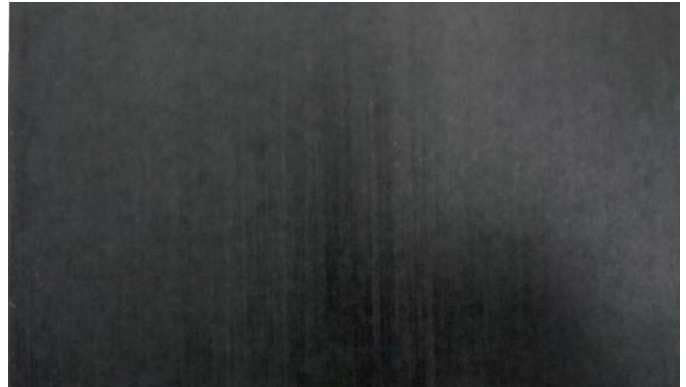


Figure B5: Acceptable – Surface finished with belt sander



Figure B3: Acceptable – Tooling marks

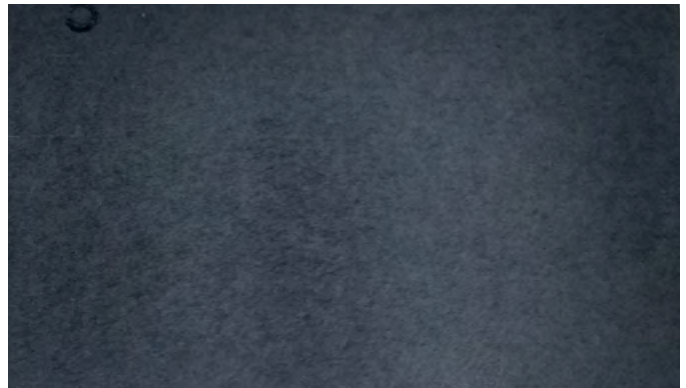


Figure B6: Acceptable – Surface finished with face and orbital sanding



Figure B7: Acceptable – Surface finished with hand scotch brite



Figure B8: Acceptable – Racking on non-cosmetic surface